

TECHNICAL DATA

XM-123 AERODERIVATIVE MODULE

SPECIAL PURPOSE MONITORING

The award winning Allen-Bradley XM® series is the world's first machine monitoring and protection system designed as a distributed network of modules deployed on an open standard industrial bus.

The XM-123 Aeroderivative Module is an intelligent 2-channel special-purpose monitor that is uniquely suited for monitoring Aeroderivative Gas Turbines. The XM-123 can be configured, per channel, to perform either tracking filter or band pass style measurements while it also continuously measures each channel's broad band overall level. These capabilities, along with its extraordinary configurability, enable the XM-123 to meet the demanding monitoring requirements of almost any engine in service today.

Like the XM-120 Standard Dynamic Measurement Module, the XM-123 provides onboard processing of critical vibration parameters, advanced alarm and relay logic, easy installation and superior serviceability.

Inputs accepted include eddy current probes, standard integrated Electronics Piezo Electric (IEPE) accelerometers, or any voltage output measurement device such as a velocity or pressure transducer. In addition to vibration inputs, the modules accept one tachometer input to provide speed measurement and order tracking functions.

With two 4-20mA outputs and a single onboard relay, expandable to five, and an integral tachometer, the XM-123 Aeroderivative Module offers a complete monitoring system in a small, simple, easily installed, easily maintained package.



The XM-123 module can operate stand alone, with no interface to higher-level control systems or interactive user interfaces. They can also be deployed on a standard or dedicated DeviceNet network where they can provide real-time data and status information to other XM modules, PLC's, DCS and Condition Monitoring Systems.

Configuration can be performed either locally or remotely via the DeviceNet network. Local configuration is provided by the included simple and intuitive Serial Configuration Utility executing on a PC connected to the modules serial communications port. Remote configuration can be performed from any networked PC executing either any standard DeviceNet configuration software, or the XM specific XM EOL Configuration software from Rockwell Software.

NOTE: The XM-120 Standard Dynamic Module can calculate all of the same parameters as the XM-123 Aeroderivative module. However, the XM-120 calculates vector and band values in the frequency domain, rather than by applying tracking or digital filters. While this method allows the XM-120 incredible flexibility it does not provide the performance required for many gas turbine monitoring applications. When gas turbine users would prefer to use the standard XM-120, rather than the XM-123 Aeroderivative, they should first consult Rockwell Automation or reference their gas turbine manufacturers monitoring system requirements specification.

SPECIFICATIONS

Communications

DeviceNet:

- Standard DeviceNet protocol for all functions
- Available Electronic Data Sheet (EDS) file provides support by most DeviceNet compliant systems
- Autobaud to 125kb, 250kb or 500kb
- Configurable I/O Poll Response size (bytes) and Assembly (6 to choose from) helps optimize space utilization within users scanner input tables

Note: The XM-123 uses only the DeviceNet protocol, not power. Module power is provided independently.

Side Connector: All XM measurement and relay modules include side connectors that allow interconnecting adjacent modules thereby simplifying the external wiring requirements. The Interconnect provides primary power, DeviceNet communication and the circuits necessary to support expansion modules such as the XM-441 Expansion Relay module.

Serial: Local configuration via Serial Utility Program

- RS-232 via mini-connector or terminal block
- 19200 baud rate

Tachometer

1 Tachometer Inputs: $\pm 25V$ (50V max peak to peak)

Input Impedance: 120k ohms minimum

Speed/Frequency Range:

1 to 1,200,000 RPM
0.0167 to 20,000Hz

Speed Measurement Error:

1 to 12,000 RPM ± 1 RPM
12,001 to 120,000 RPM ± 6 RPM
120,001 to 1,200,000 RPM ± 50 RPM

Inputs

2 Channels of:

- Accelerometer signals
- Voltage signals from any dynamic measurement device, such as a velocity or pressure transducer

Transducer Power:

- Constant current (4.5mA $\pm 20\%$ from +24V dc)*
 - None (voltage input)
- * Tachometer may be powered, constant voltage, or configured as voltage input

Voltage Range: Selectable in software as 0 to $\pm 20V$ (min) 40Vmax. peak-to-peak

Sensitivity: User configurable

Input Impedance: >100k

Outputs

4-20mA Outputs:

- Each output is independently programmed to represent measured parameter, from either channel
- 2 isolated outputs
- 300 ohm max load

Buffered Outputs:

- 1 active buffer per input channel
- Resistive buffer for tachometer

Indicators

7 LEDs:

- Module Status - red/green
- Network Status - red/green
- Channel 1 Status - off/yellow/red
- Channel 2 Status - off/yellow/red
- Tachometer Status - off/yellow/red
- Setpoint Multiplier - off/yellow
- Relay - off/red

Signal Conditioning

Sampling Modes:

- **Band Pass Mode:**
 - Minimum Freq (25 to 1000 Hz)
 - Maximum Freq (100 to 5500 Hz)
- **Tracking Filter Mode:**
 - Tracked Speed Multiple: 0.1 to 20.0 times the measured (tachometer) RPM
 - Constant Bandwidth (Hz) - or -
 - Constant Q

Frequency range: 1 Hz to 20 kHz

Resolution:

- A/D Conversion: 24 bits
- Dynamic Range: <80dBfs (0.01% fs), -90dBfs (typical)

Amplitude range: Dependent on sensitivity

Integration: One level provided in hardware

Low Pass Filters: Independently configured per channel

- Optional Overall measurement LP filter: 200 Hz - 20 kHz
- Roll Off: -24 dB per octave

High Pass Filters: Independently configured per channel

- Integration OFF: 1, 5, 10, 40, 1000 Hz
Roll Off: -30 dB per octave for the 1 Hz HPF, otherwise -24 dB per octave
- Integration ON: 5, 10, 40, 1000 Hz
Roll Off:
 - Single Integration: -30 dB per octave for the 5 Hz HPF, otherwise -24 dB per octave
 - Double Integration: -42 dB per octave for the 5 Hz HPF, otherwise -24 dB per octave

Units:

- g
- um
- volt
- mm/s
- mils
- Pa
- ips
- psi

Data Buffer

Trend Buffer: Stores a set of records containing measured parameters in response to a trigger event

- Trend Record: 1 to 9 parameters
- Trend Interval: 1 to 3600 seconds
- Trigger: The trend is saved when a specified relay actuates, or on command from an XM-440, host or controller
- Capacity: 170 to 2048 records depending on the number of parameters stored

Speed Buffer: Stores a startup/coast-down trend of measurement parameters in response to changes in speed

- Su/Cd Record: 1 to 9 parameters
- Su/Cd Interval: 1 to 3600 RPM
- Trigger: Records are sampled while speed is between user specified minimum and maximum values
- Sampled while speed is increasing only during startup.
- Capacity: 186 to 512 records depending on the number of parameters stored
- Su/Cd buffer may be latched to preserve the initial trip data in the event of subsequent trips

Measured Parameters

Overall:

- RMS
- Peak (true or calculated)
- Peak to Peak (true or calculated)

Sampling Mode:

- Band Pass Mode
 - Band Value
- Tracking Filter Mode
 - Tracked Vector Magnitude
 - Tracked Vector Phase

Gap (or transducer bias voltage)

Speed

Alarms

Number: 12 alarm and danger pairs

Alarmed Parameters: Speed, Overall, Gap, Band or Tracked Magnitude from either channel

Operators:

- Greater than
- Less than
- Inside Range
- Outside Range

Hysteresis: User defined

Speed Inhibit: A speed range may be specified for each alarm. The alarm is disabled when the speed is outside of the range.

Relays

Number:

- Single on-board relay, two sets of contacts – DPDT (2 Form C)
- Four virtual relays whose status can be used by remote Control Systems - or -
- Four additional relays when linked to an XM-441 Expansion Relay module

Onboard Relay Rating:

- Max. Voltage = 120 Vdc, 125 Vac
- Max. Current = 3.5 (Max current is up to 40°C, and then derates to 2A at 65°C)
- Min. Current = 0
- Max. Power = 60 W, 62.5 VA
- UL Rating:
 - 120 Vac @ 0.5 Amps resistive;
 - 110 Vdc @ 0.3 Amps resistive;
 - 30 Vdc @ 1.0 Amps resistive

Failsafe:

- Normally energized (failsafe), - or -
- Normally de-energized (non-fail-safe)

Latching:

- Latching, - or -
- Non-latching

Time Delay: 0 to 65 seconds in 100msec increments

Voting Logic: Single or paired "And" or "Or" logic applied to any alarms

Reset:

- Local reset switch on top of module
- Remote reset switch wired to terminal base
- Digital reset command via serial or DeviceNet interface

Activation On:

Alarm Status	Fault
Normal	Sensor Out of Range
Alert	Module Fault
Danger	Tachometer Fault
Disarm	

Non-Volatile Configuration

A copy of the module configuration is retained in non-volatile memory from where it is read upon power up.

Note: The configuration stored in Non-Volatile memory can only be deleted by module-reset command sent via the serial interface, using the Serial Configuration Utility, or via DeviceNet from any compliant software application.

Power

Redundant Power: All XM Measurement and Relay modules support redundant power. Each module includes redundant power inputs on its terminal base.

Module: 21.6 - 26.4Vdc

Consumption:

- Max: 300 mA
- Typical: 175 mA

Heat Production:

- Max: 7 Watts (24 BTU/hr)
- Typical: 4 Watts (14 BTU/hr)

Transducer: 24V DC, user configurable with wiring

Approvals

CE, C-Tick, ODVA, UL, EEX,
CSA Class I Div 2 Groups A,B,C,D

Environmental

Operating Temperature: -20 to +65°C (-4 to 149°F)

Storage Temperature: -40 to +85°C (-40 to 185°F)

Relative Humidity: 95% non-condensing

Conformal Coating: All printed circuit boards are conformal coated:

- Per material specifications: MIL-I-46058C/IPC-CC-830
- In accordance with IPC-A-610C

Physical

Dimensions:

- Height: 3.8in (97mm)
- Width: 3.7in (94mm)
- Depth: 3.7in (94mm)

Weight:

- Module: 6.8 ounces (193 grams)
- Terminal Base: 8.2 ounces (232 grams)

HOW TO ORDER

The XM-123 Aeroderivative modules can be ordered by contacting your local authorized Allen-Bradley distributor or Rockwell Automation sales office.

Catalog Number	Description
1440-VAD02-01RA	XM-123 Aeroderivative Module*
1440-TB-A	Terminal Base A for XM-12x
1440-SCDB9FXM2	XM Serial Communications Cable

* Requires Terminal Base A

www.rockwellautomation.com

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